BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
October 14, 1970

EXAMINER HEARING

IN THE MATTER OF:

Application of Moran Oil Producing & Drilling Corporation for a waterflood project, Lea County, New Mexico. Case No. 4440

BEFORE: Daniel S. Nutter, Examiner.

TRANSCRIPT OF HEARING

MR. NUTTER: Call Case No. 4440.

MR. HATCH: Application of Moran Oil Producing & Drilling Corporation for a waterflood project, Lea County, New Mexico.

MR. JENNINGS: I am James T. Jennings appearing on behalf of Moran Oil Drilling and Producing Corporation and I will have one witness, Mr. Ralph Gray.

(Witness sworn.)

(Whereupon, Applicant's Exhibits 1 through 5 were marked for identification.)

RALPH GRAY,

having been first duly sworn according to law, upon his oath, testified as follows:

DIRECT EXAMINATION

BY MR. JENNINGS:

Q Would you state your name and occupation, please?

A Ralph L. Gray; my occupation is petroleum engineer.

Q Mr. Gray, have you appeared before and testified as a petroleum engineer and as an expert before this Commission on many occasions?

A Yes, sir.

MR. JENNINGS: Does the Commission accept Mr. Gray's qualifications?

MR. NUTTER: Yes, sir.

Q (By Mr. Jennings) Mr. Gray, are you familiar with the application that has been filed on behalf of Moran Oil Producing and Drilling Corporation in this action?

A Yes, I am.

Q Have you made a study of the area and of the matter sought in the application which is for a water injection well in the Grayburg Formation in the Hobbs Pool?

A Yes, sir.

Q Referring to what has been marked as Exhibit 1, would you refer to that and identify it, please, Mr. Gray?

A Exhibit No. 1 is a map of the Hobbs pool. The Applicant's acreage is shown with the yellow coloring in the northern portion of the pool. The red arrow referrs to the Rice No. 4 well which the Applicant proposed to convert to a water injection well and will inject water into the Grayburg Formation.

Q How many wells does the Applicant have in that area, Mr. Gray?

A The Applicant has four wells on the Rice Lease and four wells on the Hardin Lease and one well in Section 17, which I am not certain what the designation is. This is located approximately a half mile east of the Hardin

Lease.

Q The Applicant is going to convert the Rice No. 4 Well?

A Yes, sir.

Q That's in the northwest northeast of Section 13?

A Yes. That's in the northwest of the northeast of Section 13, Township 18 South, Range 38 East.

Q What depth is the Applicant proposing to inject that water?

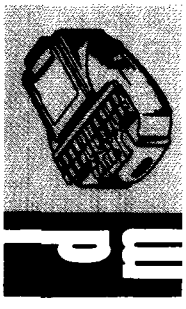
A The pay interval extends from -- oh, below a depth of four thousand feet and the bottom of the hole is short of forty-two hundred. This is seen in Exhibit 3 which is a log of this well and the open hole section extends from the depth of 4040 feet to -- well, a little below 4200 feet.

Q How much water do you propose to inject, Mr. Gray?

A This, of course, is a guess but it's anticipated that they will probably inject approximately 300 barrels per day, possibly at a pressure of 1500 pounds.

Q Where do you propose to obtain that water?

A It's proposed to drill a shallow water well to the Ogalalla Formation. The Applicant has water rights and water appropriation in the Ogalalla Formation. This well will be drilled on the lease.



Q Referring to what has been identified as Exhibit No. 4, would you identify that and explain what it is?

A Exhibit No. 4 is a diagrammatic sketch showing the location of the eight and five-eighths casing string. This string was cemented to the surface. Five and a half inch production string shown set at 4040 feet and has sufficient cement to adequately protect the formations.

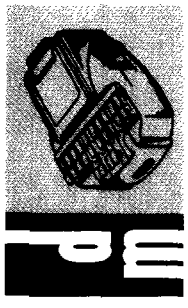
The five and a half is set below the top of the Grayburg. It's anticipated that a string of two-inch tubing will be run with a packer which will be set in the lower part of the five and a half inch casing and injection will be made below the packer into the open hole section.

Q Now, referring to Exhibit -- I believe it's Exhibit 3 -- that is a log of the injection well, is it not, Mr. Gray?

A That is correct.

Q Mr. Gray, referring now to Exhibit 4, would you tell the Commission just what that exhibit reflects -- Exhibit 5, excuse me.

A Exhibit 5 shows a tabulation of monthly oil production for the months of 1970 through July for the four wells



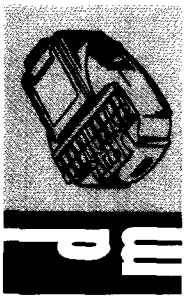
on the Rice Lease and the four wells on the Hardin B. Lease. This also shows the cumulative oil production for each of the individual wells. The purpose of this table is to show that the wells have essentially reached a stripper stage and so it is a good time to think about water injection.

Q What about this No. 4 well that you are going to convert; what type of well is it?

A This well makes less than one barrel of oil per day. None of the wells make any water to speak of.

Q What is the purpose of your injection, overall purpose?

A The Applicant wants to develop information in regard to the injectivity into the Grayburg Formation. Several engineering meetings have been held in the past in which consideration has been given to possibly forming a waterflood unit in the area, but no definite agreements were reached and in the meantime, the oil production continues to decline so that the Applicant feels that the wells have now reached a point where operators in the area will be more interested in a waterflood project and it's felt that if water can be injected into the No. 4 Rice Well, which is a rather poor well compared to the other wells on the lease, that then it can be



expected that injection can be done satisfactorily in any well in the area.

Q From your study, do you feel that the injection of water in this area is feasible?

A Yes, sir.

Q And will result in the ultimate increased production of oil?

A Yes, sir.

Q When do you propose to start injecting water, Mr. Gray?

A I'm not certain that the Applicant has any definite date in mind, but this is a thing that's going to be discussed with the operators and it's hoped that interest can be resumed and that some type of unit or at least some type of cooperative agreement might be reached within an early time.

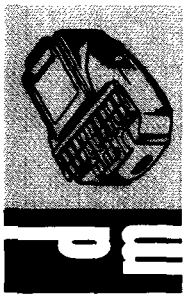
I don't think that there is any definite specific date that the operator has in mind for doing this work.

Q Do you contemplate drilling this water well and start injecting in the not too distant future?

A Yes, sir.

Q Mr. Gray, were Exhibits No. 1 through 5 prepared by you or under your supervision?

A Yes. Did we touch on Exhibit 2?



Q Yes, I think you referred to that at the outset. If you desire, you might refer to Exhibit 2 and just state what it reflects.

A Exhibit 2 is a west-east cross section through this area and this section goes through the Rice No. 4 Well. This shows the structural characteristic in the area and indicates the top of the Grayburg Formation and the top of the lower Grayburg which is close to the top of the Grayburg pay.

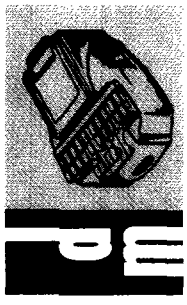
The top of the San Andres can be seen in the well on the extreme left portion of this cross section being the Continental North Hobbs Unit No. 1. This well was drilled deeper than other wells in the area. This cross section just shows that injection will be into the Grayburg pay which can be correlated clear across the structure.

Q Was this exhibit and the other four exhibits Nos. 1, 3, 4 and 5 prepared by you or under your supervision?

A Yes, sir.

MR. JENNINGS: We would offer Exhibits 1 through 5 at this time and we have nothing further.

MR. NUTTER: Moran's Exhibits 1 through 5 will be admitted in evidence.



CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Gray, the Hobbs Pool, in certainly a portion of it, is considered to be a water drive pool, is this not true?

A Yes, that's true. The large part of the Hobbs Pool is producing from the San Andres Formation and most of the San Andres does have an active water drive present.

In the extreme northern portion of the pool, however, there is oil production occurring in the Grayburg Formation and it appears that there's no active water drive present in this formation since the wells have essentially depleted and there's no evidence of water.

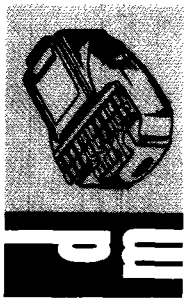
Q So you figure from the Grayburg up here in the north end you will probably be producing from a solution gas drive reservoir?

A Yes, sir.

Q No water drive that you would have in the main body of the pool?

A Yes, that's true.

Q Well, now, I noticed on your cross section a portion -- and you called it to our attention -- a portion of the Grayburg is shown in only one well. How far is it to



the San Andres wells where they are producing salt water along with their oil production, from these two leases, the Rice and the Hardin Lease?

A Well, for example, in Section 18 wells in the lower row, for example, in that section produce from the San Andres Formation.

Q Do they make considerable volumes of water?

A I really can't say. I don't have that particular information on those particular wells.

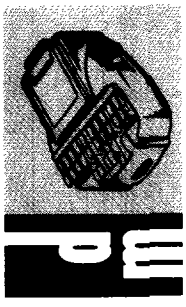
Q What I was wondering if there would be a reliable supply of salt water available somewhere in the neighborhood for operating this flood rather than using the fresh water, if it were possible?

A Well, at this stage the Applicant wishes to use fresh water. There's other things involved. The Applicant does have this water appropriation but, of course, we have to earn it but aside from that, it would be a rather complicated matter and would delay things to have to use water produced by some other operator.

Q And this operator doesn't produce any water?

A That's correct.

Q Is there production from any other horizon on either of these two leases?



A No. All the production from the Moran Leases is coming from the Grayburg Formation.

Q I see. Now, the eight and five-eighths casing which is cemented at 299 feet is this pipe set at a sufficient depth to protect the Ogalalla water formation?

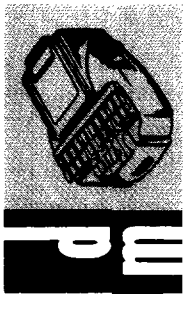
A In the case of the Rice No. 4 the eight and five-eighths inch casing is set at 299 feet and it's my understanding that the Ogalalla Formation is shallower.

Q So this would be adequate then to protect the Ogalalla?

A Yes, sir.

Let's expand our discussion a little bit more in regard to the possibility of using a produced water. A water-flood operation has to be conducted continuously with a continuous supply of water available because it takes that type of operation in order to insure a proper flood.

Now, if an attempt was made, for example, to use produced water from some producing leases in the area, for example, then you are solely dependent upon this operator continuing to produce water and having it available at all times and this definitely can't be depended upon because very often operators are attempting to shut off water by various chemical means and so forth and so it just isn't practical to try to use a source of



produced water from some other operator in the area.

Q Yes, sir.

MR. NUTTER: Are there any further questions of Mr. Gray?

CROSS EXAMINATION

BY MR. RAMEY:

Q Then again, Mr. Gray, expounding a little further on this produced water if you did, say, go to Rice Engineering, that would probably be a reliable source, they would probably have water available if you --

A The water that's collected by Rice Engineering is a complicated mixture of all types of waters that is continually changing and it's not at all what I would consider a suitable water that you would want to use for injection because there are too many problems connected with the treating of this water and it's very necessary in a waterflood project that you inject a water that will not form scales and plug the formation and various other things that can happen to you. So, by trying to use the water of this nature, you might very well condemn a project that if you were using suitable water you might be successful in, so you don't consider that that type of water would be at all useable

for this type of a project.

Q But, you don't know this, do you?

A Yes, sir, I know it by experience.

Q I mean, have you ran any compatibility tests between, say, Rice's water and the water that's in the formation in the Grayburg?

A It's my experience and I do operate quite a few waterflood projects and have for a number of years and it's my experience that this type of water is not suitable for a waterflood project.

Q Well, this water is primarily San Andres water though, is it not?

A Well, waters that are being collected by any disposal company, like I previously stated, they are always changing because somebody else drills a well some place and you might add water from some other formation next week.

Q Well, the disposal system for the Hobbs Pool is for the Hobbs Pool water, is it not? I think there might be some --

A Yes, but these people are in the business of gathering water for disposal purposes and if someone drills a deep well out here close, well, of course, they are

anxious to handle their water and dispose of it and it would have to be disposed of so next week you might very well have San Andres water mixed with Devonian water or some other formation. It just isn't a workable plan.

Q Well, probably if they mixed any water the two waters would be compatible so that they wouldn't be plugging their disposal well, wouldn't they?

A I wouldn't think that they would be compatible based on my experience.

MR. NUTTER: Well, Mr. Gray, water can be treated to make it compatible with formation water, but I think what you are saying is that from day to day operations of a salt water gathering system that's taking in wells from all formations, your water quality may change so you would have to be constantly adjusting your treating facilities.

THE WITNESS: Yes, you would have to be constantly changing your treating system, but let's not oversimplify this treating thing.

MR. NUTTER: Well, I wasn't trying to oversimplify it, I am saying water can be treated but you would have to always be adjusting and changing your treatments to take in other wells.

THE WITNESS: Water can always be treated but not always successfully. In other words, we can make an attempt to treat and we can treat it to a certain extent. I can show you operations that the water injection lines have just been clogged up almost completely shut with scale material and along with this there's been an attempt to treat this water, but what I am saying is that you can't be one hundred percent successful in treating water.

It's a very complicated, costly procedure and it just doesn't lend itself to approving a flood. You wouldn't want to condemn this thing because of an inadequate water and these waters -- these produced waters are highly complicated and can cause a lot of these scale problems regardless of the treating procedures.

MR. NUTTER: Are there further questions of Mr. Gray?

MR. JENNINGS: One other question.

REDIRECT EXAMINATION

BY MR. JENNINGS:

Q The purpose of injecting this fresh water at this time is to determine the feasibility of the flood, is it not, Mr. Gray?

A Yes. That's not to say that at some time produced

water may not be used --

Q If and when --

A -- but certainly in this stage of the thing it's felt that fresh water is desirable to approve the flood.

Q Where is the fresh water well to be located? I don't recall that we located the well. Is it to be located in the northeast quarter northwest quarter of Section 13?

A Yes, sir. That's correct.

MR. JENNINGS: I believe that's all.

MR. NUTTER: Thank you. Are there any further questions of Mr. Gray? He may be excused.

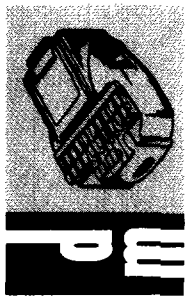
(Witness excused.)

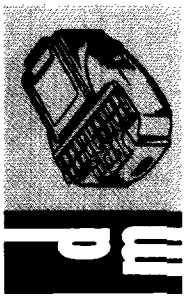
MR. NUTTER: Do you have anything futher, Mr. Jennings?

MR. JENNINGS: No, sir.

MR. NUTTER: Does anyone have anything they wish to offer in Case No. 4440?

We will take the case under advisement.





I N D E X

E X H I B I T S

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, GLENDA BURKS, Court Reporter in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings to the best of my knowledge, skill and ability.

Glenda Burks
Court Reporter

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4440 heard by me on 10/14 70

New Mexico Oil Conservation Commission